4.6   Emergency Services Access (IS-93 Section 4.4.4)

Emergency Services Access signaling allows a cellular network element to access emergency services directly or through an intervening transit network for emergency calls (e.g., fire, police, ambulance, etc.). Either side of the interface may provide the routing, bridging, and transfer functionality, so the emergency service network element accessed may be either a selective router (S/R) or a Public Safety Answering Point (PSAP). This interface is not symmetrical, so calls from emergency services appear as a normal incoming call.

~~Emergency Services Access signaling allows a cellular network element to directly access an emergency services tandem or Emergency Services Access Point (ESAP). The emergency services tandem routes emergency calls (e.g., fire, police, ambulance, etc.) to an ESAP. A directly connected ESAP arrangement can be used where high-volume emergency traffic is anticipated. Connections that are made to the ESAP are optionally controlled by the ESAP regardless of the action of the calling party. For example, an interconnection to an ESAP via the POI-T8, POI-T9 or POI-S9 interfaces is characterized by special use of disconnect control signaling.~~ The key signaling information elements included in the address signaling sequence to obtain access to emergency services should be the following:

- ~~ESAP identification (to select the appropriate ESAP);~~

- subscriber location (indirectly able to select the appropriate PSAP) ~~and~~;

- subscriber identification.

Emergency Services Access signaling is provided via the following interface types:

- POI-T8 (MF);

- POI-T9 and POI-S9 (ISUP).

The POI-T8 interface uses inband MF signaling. This interface provides access to ~~services that are provided by the~~ emergency services ~~tandem or PSAP~~ ESAP ~~only~~.

The POI-T9 and POI-S9 interfaces use SS7 ISUP protocol signaling. The POI-S9 interface is used to control emergency calls ~~user traffic~~ transferred across the POI-T9 interface. ISUP messages are used to establish and release the SS7 supported trunks and to provide supplementary ISDN services.

~~The specification of the POI-T8, POI-T9 and POI-S9 interfaces is for further study. Refer to annex A - Emergency Services Models for the emergency services access models under study.~~

4.7   Transaction Capabilities Application Part (TCAP) - SS7

The Transaction Capabilities Application Part of SS7 provides signaling across the POI-S interface. The TCAP interface provides transaction capabilities between application layer entities. Transaction capabilities provide operations for the transfer of non-circuit related information between SS7 network nodes (SPs) and provide generic services to applications, while being independent of those services. The TCAP protocol requires the SCCP and the MTP as the underlying layers for SS7.

The following information is required for the TCAP interfaces:

- **Operation Family**;

- **Operation Set**;

- **TCAP Version** (e.g., i.e., ANSI or ITU-CCITT version);

- **Supported Nodes** (i.e., Service Switching Point or Service Control Point);

- **Application Address** (i.e., Point Code and SSN).

Additional signaling information provided by TCAP is specified in the ANSI T1.114 or the ITU-CCITT Q.771 - Q.775 specifications of SS7 (see Section 2 - References).

4.8   Emergency Services Signaling (IS-93 Section X) ***NEW***

4.8.1   POI-T8 (MF) Interface Signaling Scenarios (IS-93 Section X.1)

Table 12A: POI-T8 Signaling Information Field Contents

Call Type	1st Stage Address Field	2nd Stage Identification and Address Fields
Emergency Services Direct Call with location only	KP + 4-10D + ST	None
Emergency Services Direct Call with ANI only	KP + (II + ANI) + ST1P	None
Emergency Services Direct Call with location and ANI	KP + (II + ANI) + ST + KP + 7/10D + ST	None
IC Direct Call with location only (separated signaling, direct IC connection)	KP + 7/10D + ST	None
IC-Direct Call with ANI only (contiguous signaling, direct IC connection)	KP + 0ZZ + XXX + ST	KP + (II + ANI) + ST1P
IC Direct Call with location and ANI (contiguous signaling, direct IC connection)	KP + 0ZZ + XXX + ST	KP + (II + ANI) + ST + KP + 7/10D + ST
INC Direct (WZ1)	KP + 1NX + XXX + 01R + ST	KP + (II + ANI) + ST KP + 10D + ST

Notes:

1. The 4-10D, 7/10D and 10D in this table are encoded with the base station, cellsite or sector identification. It may be a routable number to allow it to pass through intervening networks.

2. The ANI in this table is encoded with the calling party's Mobile Directory Number or Mobile Station ISDN number, instead of the calling party's charge number. This number identifies the calling party and may be used as a callback number for the calling party. The ANI should be passed unmodified by intervening networks.
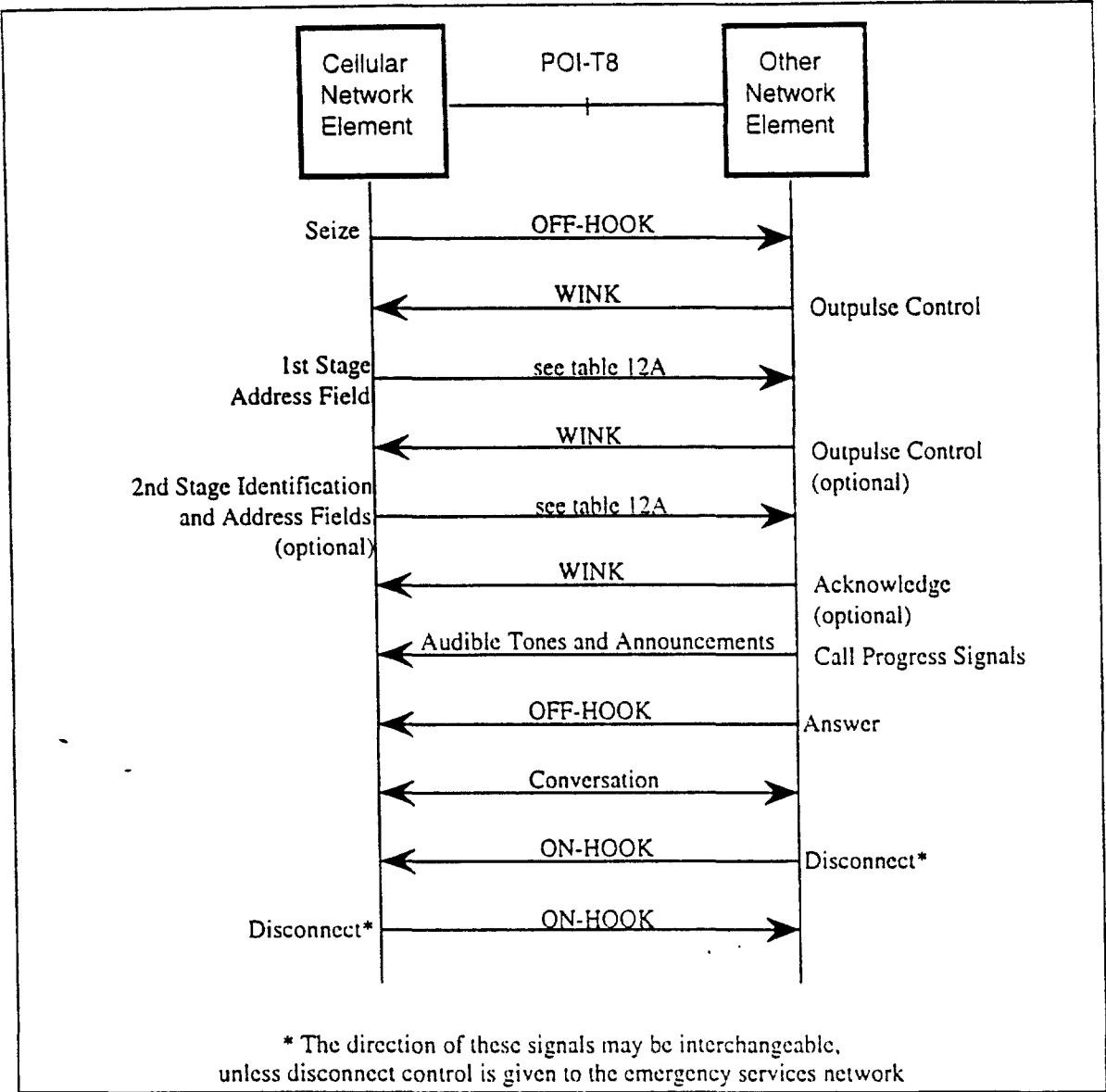
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* The direction of these signals may be interchangeable,
unless disconnect control is given to the emergency services network

**Figure 13A: POI-T8 Interface Signaling Scenario - Cellular Network
Origination (No INC Connection)**

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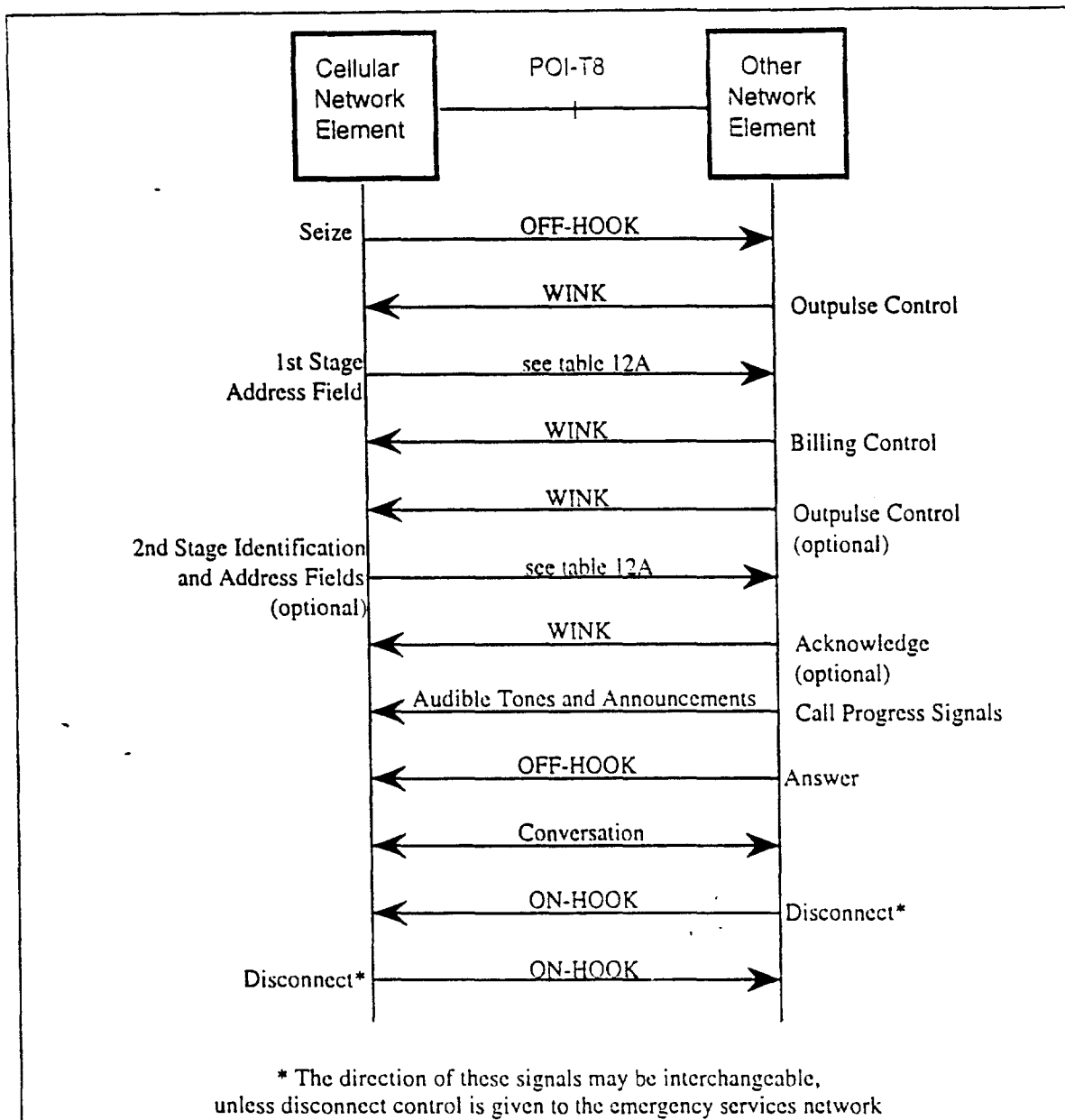48
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Figure 13B: POI-T8 Interface Signaling Scenario - Cellular Network Origination (With INC Connection)

4.8.2   POI-T9 (ISUP) Interface Signaling Scenarios (IS-93 Section X.2)

Table 12B: POI-S9 Signaling Information Field Contents

Call Type	ISUP IAM Parameters	ANSI T1.113.3 Reference Section
Emergency Services Direct Call with location only	Message Type Nature of Connection Indicators Forward Call Indicators Calling Party's Category (= emergency service call) User Service Information Called Party Number (4-10D) Generic Address	Section 1.3 Section 3.24 Section 3.20 Section 3.8 (T1.628 Section 7.1.2.2) Section 3.33 Section 3.6 (T1.628 Section 7.1.2.1)
Emergency Services Direct Call with location only (separated signaling, direct IC connection)	Message Type Nature of Connection Indicators Forward Call Indicators Calling Party's Category (= emergency service call) User Service Information Called Party Number (7/10D) Generic Address	Section 1.3 Section 3.24 Section 3.20 Section 3.8 (T1.628 Section 7.1.2.2) Section 3.33 Section 3.6 (T1.628 Section 7.1.2.1)
Emergency Services Direct Call with location and ANI (contiguous signaling, indirect IC connection)	Message Type Nature of Connection Indicators Forward Call Indicators Calling Party's Category (= emergency service call) User Service Information Called Party Number (7/10D) Charge Number (e.g., ANI) Originating Line Information (II) Transit Network Selection (ZZ + XXX) Generic Address	Section 1.3 Section 3.24 Section 3.20 Section 3.8 (T1.628 Section 7.1.2.2) Section 3.33 Section 3.6 Section 3.10 Section 3.26A Section 3.31B (T1.628 Section 7.1.2.1)
IC Direct Call	Message Type Nature of Connection Indicators Forward Call Indicators Calling Party's Category (= emergency service call) User Service Information Called Party Number (7/10D) Charge Number (e.g., ANI) Originating Line Information (II) Transit Network Selection (ZZ + XXX) Generic Address	Section 1.3 Section 3.24 Section 3.20 Section 3.8 (T1.628 Section 7.1.2.2) Section 3.33 Section 3.6 Section 3.10 Section 3.26A Section 3.31B (T1.628 Section 7.1.2.1)

Table 12 (continued)

INC Direct (WZ1)	Message Type Nature of Connection Indicators Forward Call Indicators Calling Party's Category (= emergency service call) User Service Information Called Party Number (10D) Charge Number (e.g., ANI) Originating Line Information (II) Transit Network Selection (XXX) Generic Address	Section 1.3 Section 3.24 Section 3.20 Section 3.8 (T1.628 Section 7.1.2.2) Section 3.33 Section 3.6 Section 3.10 Section 3.26A Section 3.31B (T1.628 Section 7.1.2.1)

Notes:

1. The Called Party field in this table is encoded with the cell and sector identification. It may be a routable number to allow it to pass through intervening networks.

2. The Charge Number in this table is encoded with the calling party's Mobile Directory Number or Mobile Station ISDN number, instead of the calling party's charge number. This number identifies the calling party and may be used as a callback number for the calling party. The ANI should be passed unmodified by intervening networks.

The following table describes the normal interworking between MF and ISUP networks. Note that the Charge Number must be used to transparently convey a number. The Charge Number or ANI may not be used on the egress of some networks, so ISUP or special considerations may be required to convey the callback number end-to-end.

Table 12C: Typical Interworking Between SS7 ISUP and MF

From ISUP	To MF
Charge Number (or Calling Number when the Charge Number is not supplied)	ANI
Called Number	Called Number
Calling Number (with separate Charge Number supplied)	(Discarded)

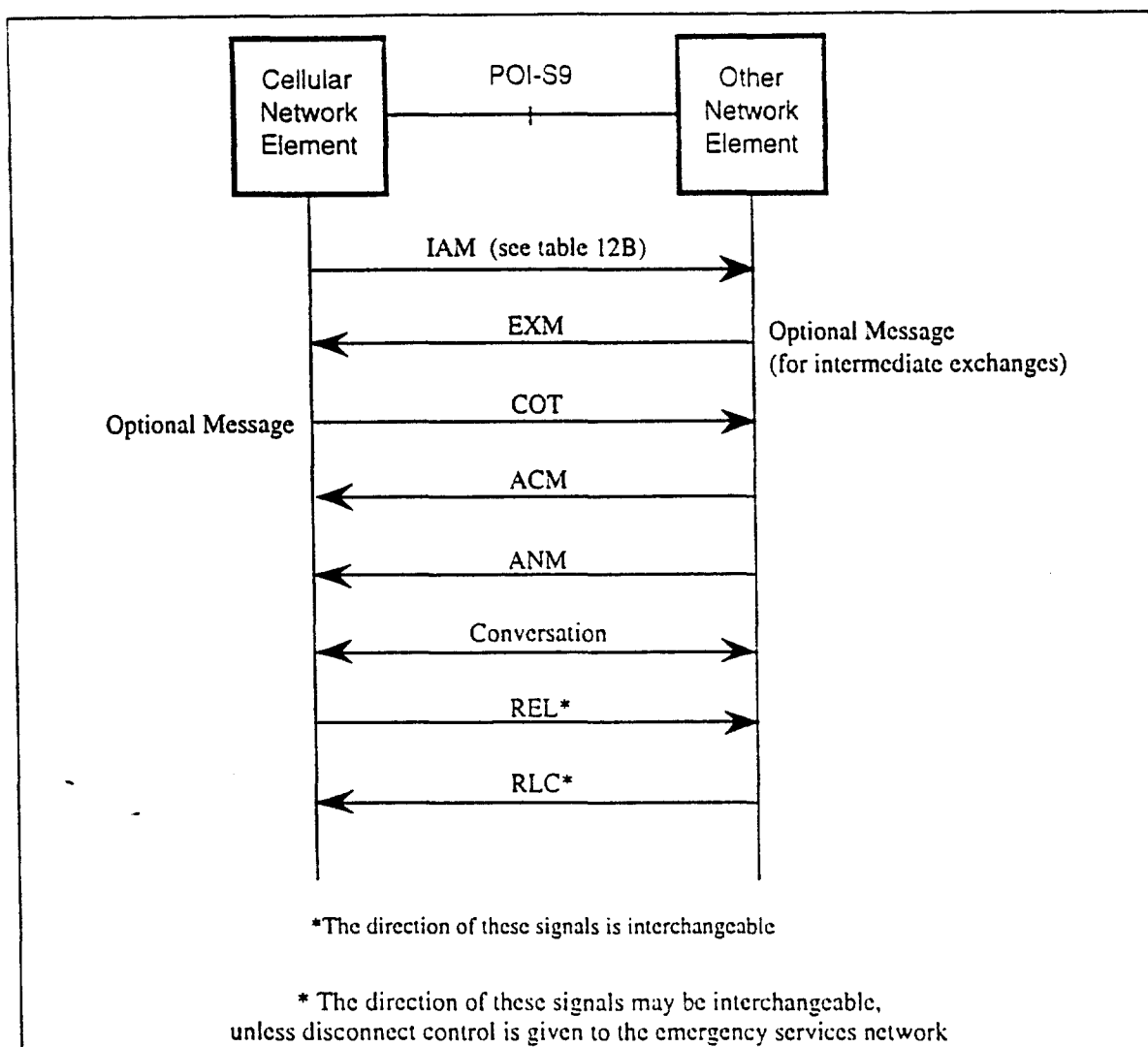| From MF	To ISUP
ANI	Charge Number
Called Number	Called Number
	(Calling Number is not used)

Figure 13C: POI-S9 Interface Signaling Scenario - Cellular Network Originated

4.8.3   Annex A - Emergency Services Models

This annex will be removed. Parts of the annex will be included in the definitions of POI-T8 and POI-S9.

TR45

Enhanced
Emergency Services

PN-3581.7

ANSI/TIA/EIA 41 Stage 3 Modifications

Ballot Version

ENHANCED EMERGENCY SERVICES:
ANSI/TIA/EIA 41 STAGE 3 MODIFICATIONS

Contents

LIST OF FIGURES

None

LIST OF TABLES

FOREWORD

This Foreword is not part of this Interim Standard.

This is one of a series of recommendations entitled

"ENHANCED EMERGENCY SERVICES"

which provides a solution for the limited capabilities of wireless Enhanced Emergency Services. These capabilities include:

- provision of base station, cellsite or sector identification information

- subscriber identification

- callback

- reconnect

The recommendations included in this series are:

- PN-3581.1,   Enhanced Emergency Services: Functional Overview

- PN-3581.2,   Enhanced Emergency Services: PSAP Perspective

- PN-3581.3,   Enhanced Emergency Services: Emergency Services Stage 2

- PN-3581.4,   Enhanced Emergency Services: *ANSI/TIA/EIA 41* Stage 2
          Modifications

- PN-3581.5,   Enhanced Emergency Services: *ANSI J-STD-023* Stage 2
          Modifications

- PN-3581.6,   Enhanced Emergency Services: *TIA/EIA/IS-93* Modifications

- PN-3581.7,   Enhanced Emergency Services: *ANSI/TIA/EIA 41* Stage 3
          Modifications

- PN-3581.8,   Enhanced Emergency Services: *ANSI J-STD-024*
          Modifications

REVISION HISTORY

Revision	Date	Remarks
0	????	Initial Publication
A		
B		

NOTE

The numbering system of this series of Interim Standards varies from normal TIA/EIA practice. The unique numbering system assigned to these documents is intended to reflect their hierarchical structure.

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1.   INTRODUCTION

1.1   OBJECTIVE

This document presents recommendations for modifications to *ANSI/TIA/EIA 41* Stage 3 for the support Enhanced Emergency Services.

1.2   SCOPE

This document provides a solution for modifications to *ANSI/TIA/EIA 41* Stage 3 to support Enhanced Emergency Services.

1.3   ORGANIZATION

This document is organized by the following sections:

- Section 1, entitled "Introduction," provides introductory information for this Interim Standard.

- Section 2, entitled "References," lists the normative and informative references for this Interim Standard.

- Section 3, entitled "Terminology," lists the definitions, symbols, abbreviations, and other documentation conventions used in this Interim Standard.

- Section 4, entitled *"ANSI/TIA/EIA 41* Stage 3 Modifications," defines the modifications to the intersystem messaging parameters in *ANSI/TIA/EIA 41* necessary to support Enhanced Emergency Services.

2.   REFERENCES

The *ANSI/TIA/EIA 41* recommendations are:

- ANSI/TIA/EIA 41.1,   *Cellular   Radiotelecommunications   Intersystem Operations: Functional Overview*

- ANSI/TIA/EIA 41.2,   *Cellular   Radiotelecommunications   Intersystem Operations: Intersystem Handoff Information Flows*

- ANSI/TIA/EIA 41.3,   *Cellular   Radiotelecommunications   Intersystem Operations: Automatic Roaming Information Flows*

- ANSI/TIA/EIA 41.4,   *Cellular   Radiotelecommunications   Intersystem Operations: Operations, Administration, and Maintenance Information Flows*

- ANSI/TIA/EIA 41.5,   *Cellular   Radiotelecommunications   Intersystem Operations: Signaling Protocols*

- ANSI/TIA/EIA 41.6,   *Cellular Radiotelecommunications Intersystem Operations: Signaling Procedures*

The *TIA/EIA/IS-93* recommendations are:

- TIA/EIA/IS-93-0,   *Cellular   Radio   Telecommunications   Ai   -   Di Interfaces*

The *ANSI J-STD-023* recommendations are:

- ANSI J-STD-023,   *PCN to PCN Intersystem Operations based on PCS1900 Standard, approved for publication.*

The *ANSI J-STD-024* recommendations are:

- ANSI J-STD-024,   *Personal Communication Services, SS7 based A-interface Standard, approved for publication.*

3.   TERMINOLOGY

3.1   DEFINITIONS

Refer to IS-911.1.

3.2   SYMBOLS AND ABBREVIATIONS

Refer to IS-911.1.

4.   *ANSI/TIA/EIA 41* Stage 3 Modifications

6.4.2.12   FacilitiesDirective2

The FacilitiesDirective2 operation is used to request that the Target MSC initiate the Handoff-Forward task. This operation differs from the FacilitiesDirective operation in its addition of support for CDMA and NAMPS MSs.

The FacilitiesDirective2 operation is initiated with a TCAP INVOKE (LAST). This is carried by a TCAP QUERY WITH PERMISSION package. The Parameter Set is encoded as follows:

Table 33   FacilitiesDirective2 INVOKE Parameters

FacilitiesDirective2 INVOKE Parameters				Timer: HOT
Field	Value	Type	Reference	Notes
Identifier	SET [UNIVERSAL 17]	M	6.4.1.2	
Length	variable octets	M	6.4.1.1	
Contents				
BillingID		M	6.5.2.16	
No changes to existing parameters				
SpecialHandling		O	6.5.2.xx	r

Notes:

a..q. No changes to these notes

r.   Include if any fields in this parameter are non-zero.

The FacilitiesDirective2 operation success is reported with a TCAP RETURN RESULT (LAST). This is carried by a TCAP CONVERSATION WITH PERMISSION package. The Parameter Set is encoded as follows:

6.4.2.15   FlashRequest

The FlashRequest operation is used to forward a flash received from an MS engaged in a call toward the Anchor MSC (possibly via one or more Tandem MSCs).

The FlashRequest operation is initiated with a TCAP INVOKE (LAST). This is carried by a TCAP QUERY WITH PERMISSION package. The Parameter Set is encoded as follows:

Table 39   FlashRequest INVOKE Parameters

FlashRequest INVOKE Parameters				Timer: FRT
Field	Value	Type	Reference	Notes
Identifier	SET [UNIVERSAL 17]	M	6.4.1.2	
Length	variable octets	M	6.4.1.1	
Contents				
Digits (Dialed)		M	6.5.2.58	a
InterMSCCircuitID		M	6.5.2.72	
MobileIdentificationNumber		M	6.5.2.81	
ConfidentialityModes (Actual)		O	6.5.2.50	b
ElectronicSerialNumber		O	6.5.2.63	
EmergencyServicesRoutingDigits		O	6.5.2.XX	c

Notes:

a.   The Digits parameter is sent non-encrypted.

b.   Include if the SignalingMessageEncryptionKey parameter was provided to the Serving MSC.

c.   Include to specify the location of the MS.

The FlashRequest operation success is reported with a TCAP RETURN RESULT (LAST). This is carried by a TCAP RESPONSE package. The Parameter Set is encoded as follows:

Table 40   FlashRequest RETURN RESULT Parameters

FlashRequest RETURN RESULT Parameters				
Field	Value	Type	Reference	Notes
Identifier	SET [UNIVERSAL 17]	M	6.4.1.2	
Length	zero octets	M	6.4.1.1	
Contents				
SpecialHandling		O	6.5.2.XX	a

Notes:

a.   Include if any fields in this parameter are non-zero.

6.4.2.17   HandoffBack2

The HandoffBack2 operation is used by the Serving MSC to request that the Target MSC initiate the Handoff-Back task. This task is used to handoff a call to a Target MSC to which the Serving MSC is already connected, for the call in question, via an inter-MSC trunk. This operation differs from the HandoffBack operation in its addition of support for CDMA and NAMPS MSs.

The HandoffBack2 operation is initiated with a TCAP INVOKE (LAST). This is carried by a TCAP QUERY WITH PERMISSION package. The Parameter Set is encoded as follows:

Table 43   HandoffBack2 INVOKE Parameters

HandoffBack2 INVOKE Parameters				Timer: HOT
Field	**Value**	**Type**	**Reference**	**Notes**
Identifier	SET [UNIVERSAL 17]	M	6.4.1.2	
Length	variable octets	M	6.4.1.1	
Contents				
BillingID		M	6.5.2.16	
no changes to existing parameters				
<u>SpecialHandling</u>		<u>Q</u>	<u>6.5.2.XX</u>	<u>r</u>

Notes:

     a..q. no changes

     <u>r.   Include if any fields in this parameter are non-zero.</u>

6.4.2.21   HandoffToThird2

The HandoffToThird2 operation is used by the Serving MSC (non-Anchor) to initiate a handoff with path minimization. This operation differs from the HandoffToThird operation in its support of dual-mode CDMA and NAMPS MSs.

The HandoffToThird2 operation is initiated with a TCAP INVOKE (LAST). This is carried by a TCAP QUERY WITH PERMISSION package. The Parameter Set is encoded as follows:

Table 51   HandoffToThird2 INVOKE Parameters

HandoffToThird2 INVOKE Parameters				Timer: HTTT
Field	**Value**	**Type**	**Reference**	**Notes**
Identifier	SET [UNIVERSAL 17]	M	6.4.1.2	
Length	variable octets	M	6.4.1.1	
Contents				
BillingID		M	6.5.2.16	
no changes to existing parameters				
SpecialHandling		Q	6.5.2.XX	q

Notes:

  a..p. no changes

  q.   Include if any fields in this parameter are non-zero.

The HandoffToThird2 operation success is reported with a TCAP RETURN RESULT (LAST). This is carried by a TCAP RESPONSE package. The Parameter Set is encoded as follows:

6.5.1.2   Parameter Identifiers

The following table lists the *IS-41* MAP Parameter Identifiers.

Table 118   *IS-41* MAP Parameter Identifiers

Parameter Identifier Name	Parameter Identifier Code								Reference
	H	G	F	E	D	C	B	A	
BillingID	1	0	0	0	0	0	0	1	6.5.2.16
ServingCellID	1	0	0	0	0	0	1	0	6.5.2.117
	. . .								
EmergencyServicesRoutingDigits	X								6.5.2.XX
SpecialHandling	X								6.5.2.XX

6.5.2.XX   EmergencyServicesRoutingDigits ***NEW***

The EmergencyServicesRoutingDigits (ESRD) parameter is a BCD digit string identifying a base station, cellsite or sector.

Field	Value	Type	Reference	Notes
Identifier	EmergencyServicesRoutingDigits IMPLICIT DigitsType	M	6.5.1.2	a
Length	variable octets	M	6.5.1.1	
Contents				

H	G	F	E	D	C	B	A	octet	Notes
Type of Digits								1	b
Nature of Number								2	c
Numbering Plan				Encoding				3	d, e
Number of Digits								4	f
2nd BCD Digit				1st BCD Digit				5	
4th BCD Digit				3rd BCD Digit				6	
•••				•••				•••	
n^{th} BCD Digit				n-1st BCD Digit				m	

Figure 122   EmergencyServicesRoutingDigits parameter for BCD digits

Notes:

a.   Refer to the DigitsType parameter type (see 6.5.3.2) for notes and field encoding.

b.   The Type of Digits field is ignored on receipt.

c.   The Nature of Number field is set as applicable.

d.   The Numbering Plan field is set to *Telephony Numbering*.

e.   The Encoding field is set to *BCD*.

f.   The Number of Digits is between 0 and at least 15.

6.5.2.XX   SpecialHandling ***NEW***

The presence of the SpecialHandling (SHH) parameter indicates that a call requires special handling (e.g., an emergency call, requiring reconnect upon abnormal disconnect).

Field	Value	Type	Reference	Notes
Identifier	SpecialHandling IMPLICIT OCTET STRING	M	6.5.1.2	
Length	variable octets	M	6.5.1.1	

Contents										

H	G	F	E	D	C	B	A	octet	Notes
Reserved							911	1	
•••								n	a, b

Figure xx   SpecialHandling parameter

Notes:

a.   Set reserved values to 0 when sending, ignore if received.

b.   Ignore extra octets, if received. Send only defined (or significant) octets.

Table xx   SpecialHandling value

(octet 1, bit A)		
Bits H G F E D C B A	Value	Meaning
0	0	Not Used.
1	1	An emergency call, requiring reconnect upon abnormal mobile disconnect.